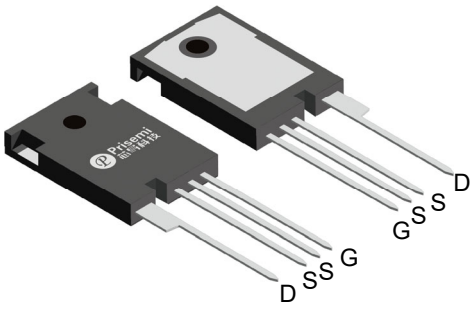
Prisemi®

PSICM4TAT75R23

SiC MOSFET

Description

MOSFET Product Summary		
V_{DS}(V)	$R_{DS(on)}$(mΩ)	I_D(A)
750	23 mΩ@ V_{GS}= 18V	89



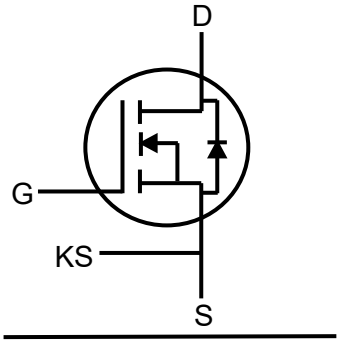
TO-247-4L (Top View)

Feature

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Avalanche Ruggednes

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Schematic diagram

Absolute maximum rating@25℃

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	750	V
Gate-Source Voltage （Absolute maximum values）		V_{GSmax}	-8/+22	V
Gate-Source Voltage (Recommended operational values)		V_{GSop}	-4/+18	V
Continuous Drain Current	T_C=25℃, V_{GS}=18V	I_D	89	A
	T_C=125℃, V_{GS}=18V		52	
Pulsed drain current (T_C=25℃, Puls width tp limited by Tjmax)		I_{DM}	235	A
Avalanche energy, single pulse (L=10mH)		E_{AS}	2200	mJ
Power dissipation	T_C=25℃	P_{tot}	246	W
Operating junction and storage temperature		T_J , T_{STG}	-55 to +175	℃
Soldering Temperature		T_{SOLD}	260	℃

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	-	-	0.61	℃/W
Thermal resistance, junction – ambient	R_{thJA}	-	-	40	

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Statistic Characteristics							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V,I_D = 100μA		750	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= 1200V,V_{GS} = 0V T_j=25°C		-	1	5	μA
		V_{DS}= 1200V,V_{GS} = 0V T_j=175°C		-	5	-	
Gate-Body Leakage Current	I_{GSS}	V_{GS} = 18V,V_{DS} = 0V		-	-	100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS},I_D = 10mA		2	2.8	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 18V,I_D = 33A	T_j=25°C	-	22	28	mΩ
			T_j=175°C	-	30	-	
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 15V,I_D = 33A	T_j=25°C	-	27	35	mΩ
			T_j=175°C	-	32	-	
Dynamic Characteristics							
Input Capacitance	C_{lss}	V_{GS}=0V,V_{DS} = 600V, f=1MHz, V_{GS}=0V, V_{AC}=25mV, f = 1MHz, T_j=25°C		-	2823	-	pF
Output Capacitance	C_{oss}			-	179	-	
Reverse Transfer Capacitance	C_{rss}			-	9.2	-	
Gate Resistance	R_G	V_{AC}=25mV, f=1MHz		-	1.6	-	Ω
Total Gate Charge	Q_g	V_{DS}=600V, I_D=33A, V_{GS}=0V/+18V, I_G=10mA		-	95.8	-	nC
Gate-Source Charge	Q_{gs}			-	19.6	-	
Gate-Drain Charge	Q_{gd}			-	43.8	-	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=600V, V_{GS}=-4/+18V, I_D=33A, $R_{g(ext)}$=5Ω, L=100μH, T_j=25°C		-	25	-	ns
Turn-on Rise Time	t_r			-	37	-	
Turn-Off Delay Time	$t_{d(off)}$			-	57	-	
Turn-Off Fall Time	t_f			-	17	-	
Turn-On Energy	E_{on}			-	1043	-	μJ
Turn-Off Energy	E_{off}			-	828	-	

Electrical characteristics per line@25℃ (unless otherwise specified)

Reverse Diode Characteristics							
Body Diode Forward Voltage	V_{SD}	V_{GS}=-4V,I_{SD}=17A	T_J=25°C	-	4.2	-	V
			T_J=175°C	-	3.8	-	
Continuous Diode Forward Current	I_S	V_{GS}=-4V	T_c=25°C	-	89	-	A
			T_c=100°C	-	52	-	
Reverse Recovery Time	t_{rr}	V_{GS}=-4V, V_R=600V, I_D=33A, di/dt=1000A/μs	T_J=25°C	-	21.6	-	ns
			T_J=175°C	-	33.7	-	
Reverse Recovery Charge	Q_{rr}		T_J=25°C	-	167	-	nC
			T_J=175°C	-	326	-	
Peak Reverse Recovery Current	I_{rrm}		T_J=25°C	-	13.7	-	A
			T_J=175°C	-	18.5	-	

Typical Characteristics

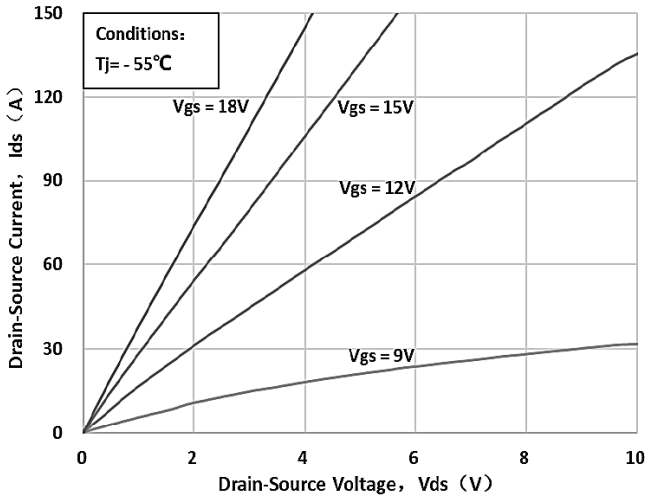


Figure 1. Output Characteristics T_J = -55 ºC

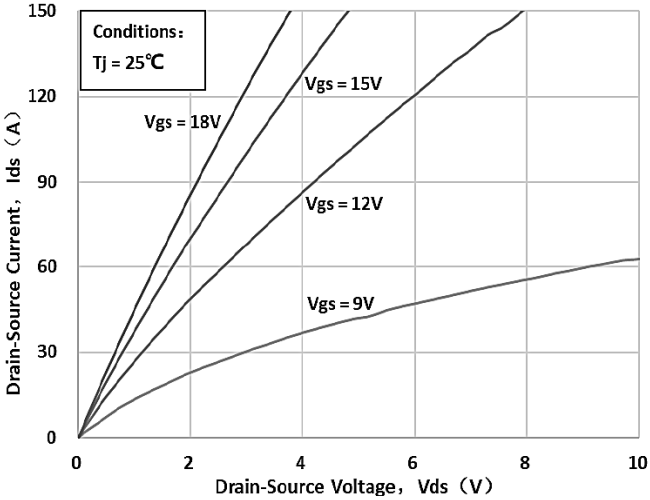


Figure 2. Output Characteristics T_J = 25 ºC

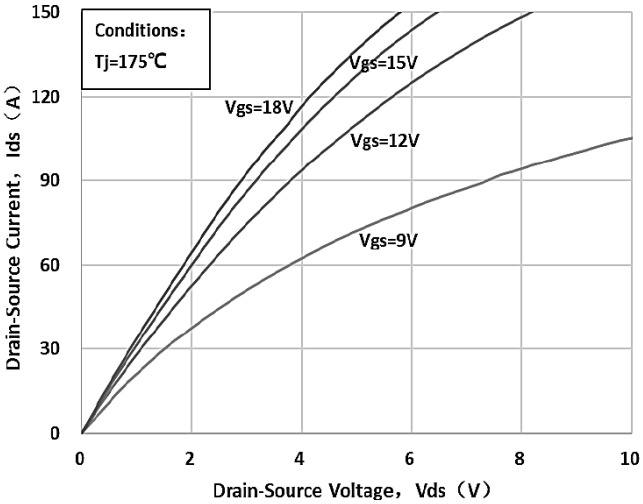


Figure 3. Output Characteristics T_J = 175 ºC

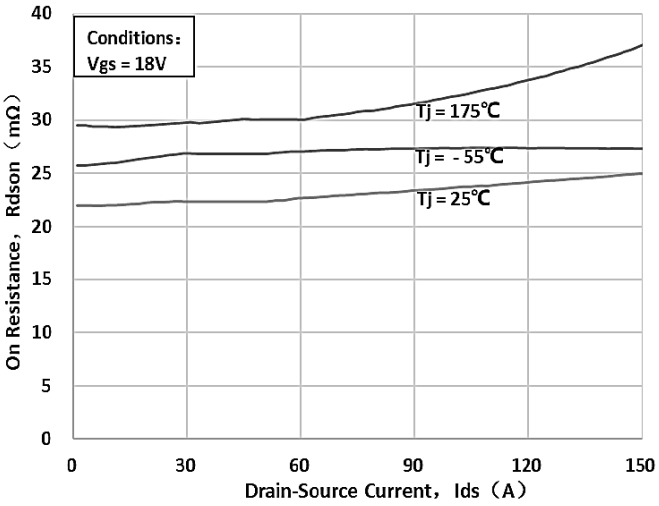


Figure 4. On-Resistance vs. Drain Current For Various Temperatures

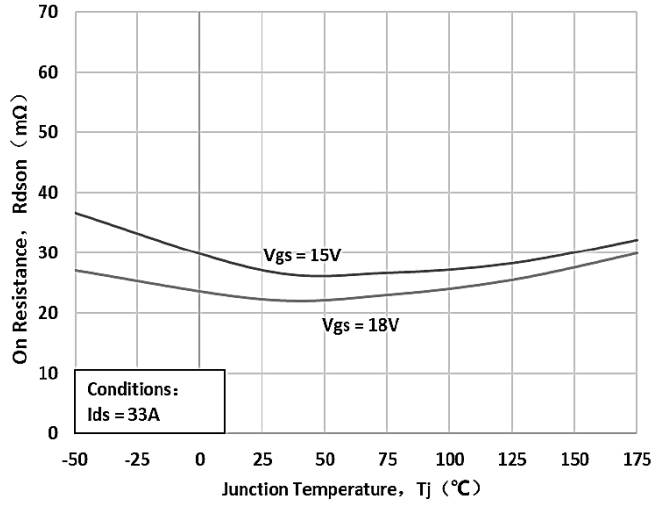


Figure 5. On-Resistance vs. Temperature For Various Gate Voltage

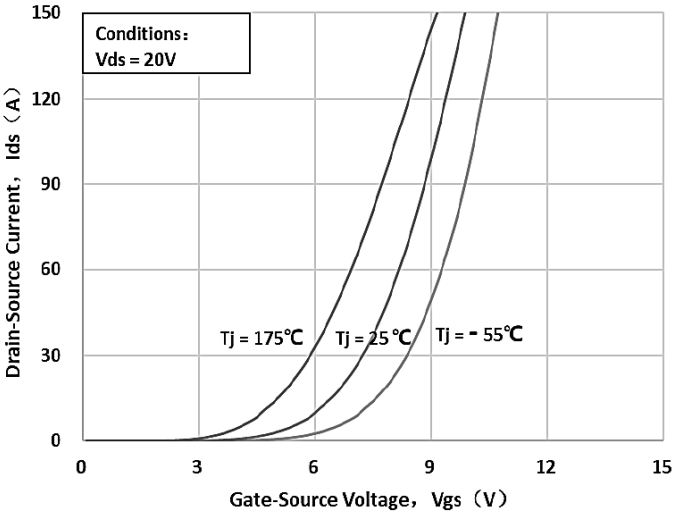


Figure 6. Transfer Characteristic for Various Junction Temperatures

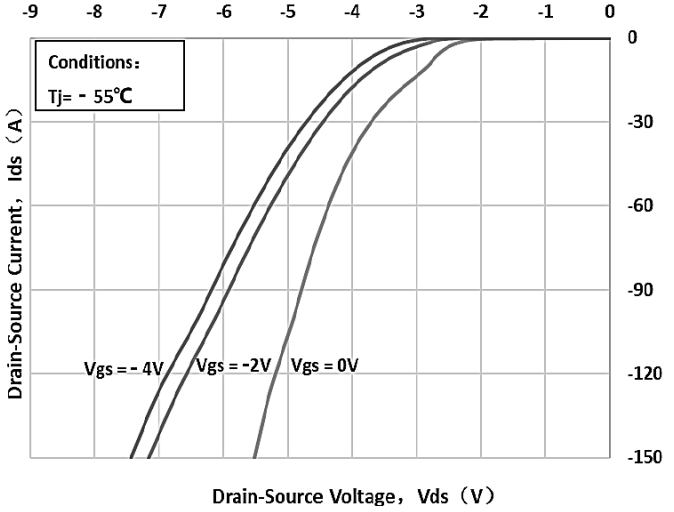


Figure 7. Body Diode Characteristic at -55 ºC

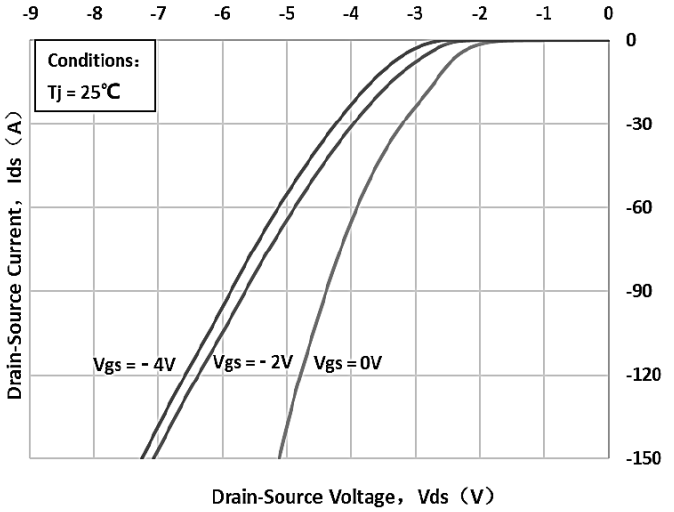


Figure 8. Body Diode Characteristic at 25 ºC

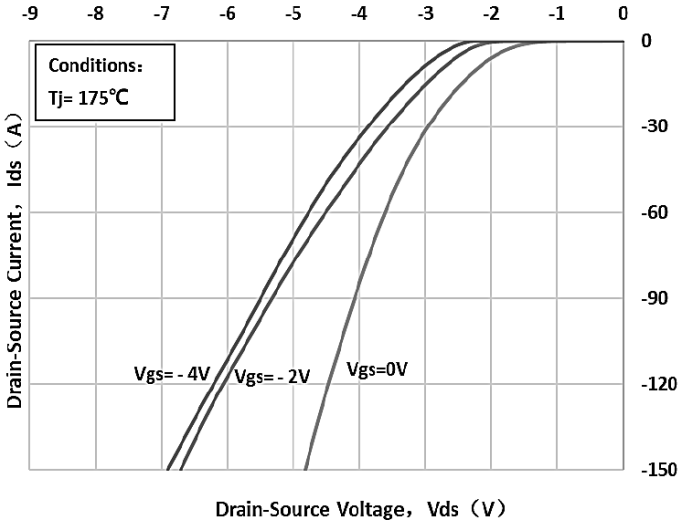


Figure 9. Body Diode Characteristic at 175 ºC

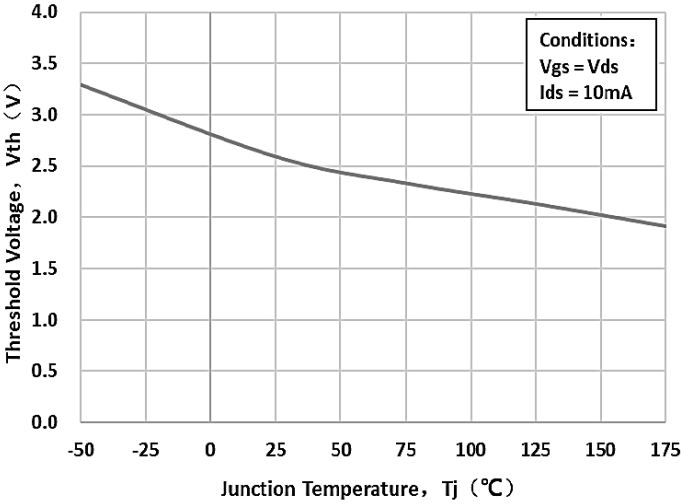


Figure 10. Threshold Voltage vs. Temperature

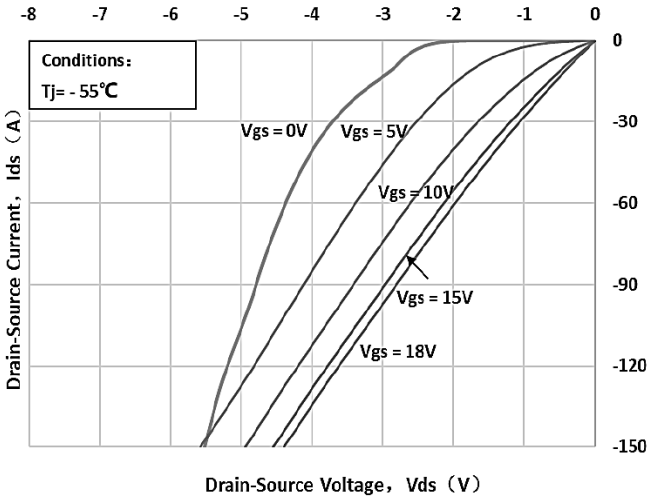


Figure 11. 3rd Quadrant Characteristic(T_J=-55℃)

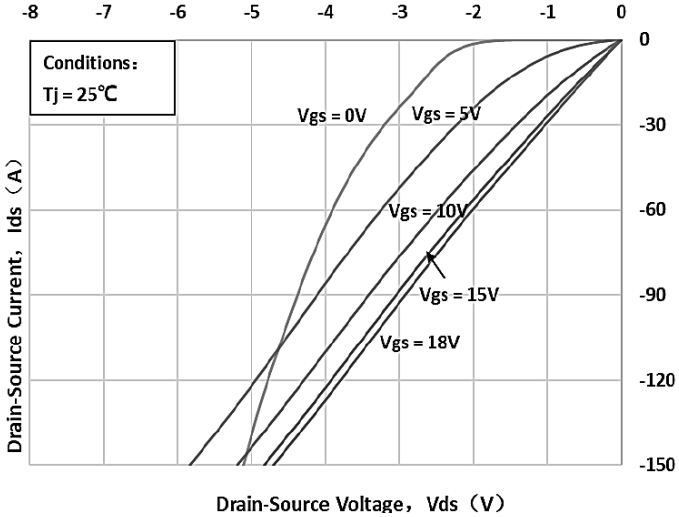


Figure 12. 3rd Quadrant Characteristic(T_J=25℃)

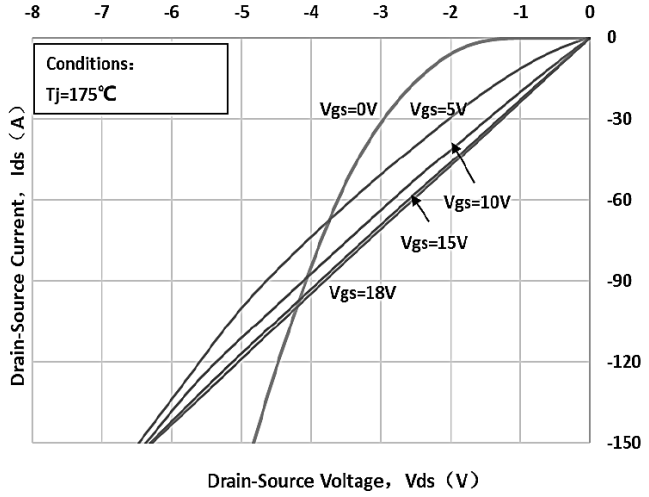


Figure 13. 3rd Quadrant Characteristic(T_J=175℃)

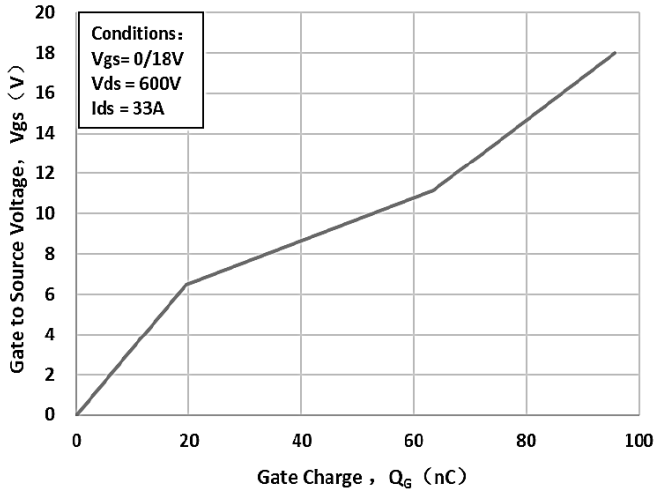


Figure 14. Gate Charge Characteristics

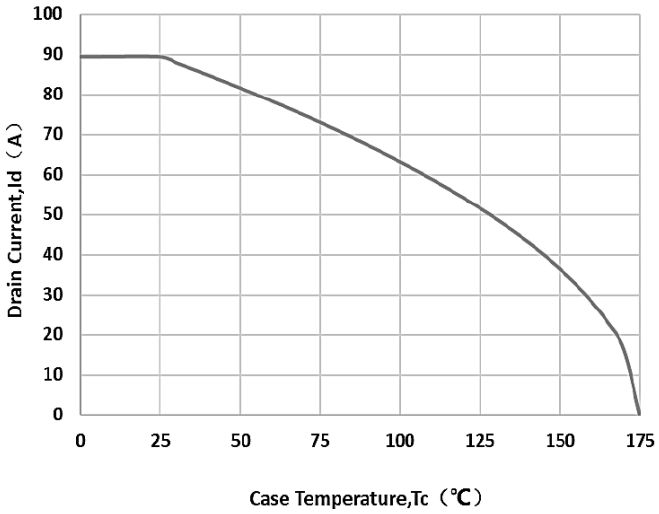


Figure 15. Drain Current vs.Case Temperature

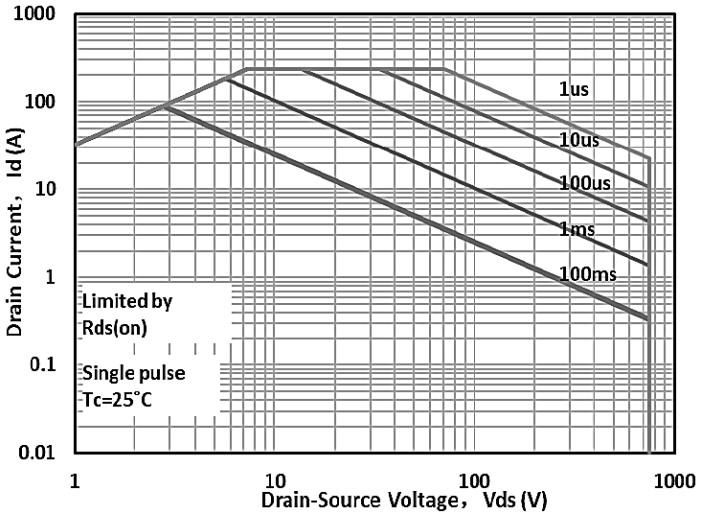


Figure 16. Safe Operating Area

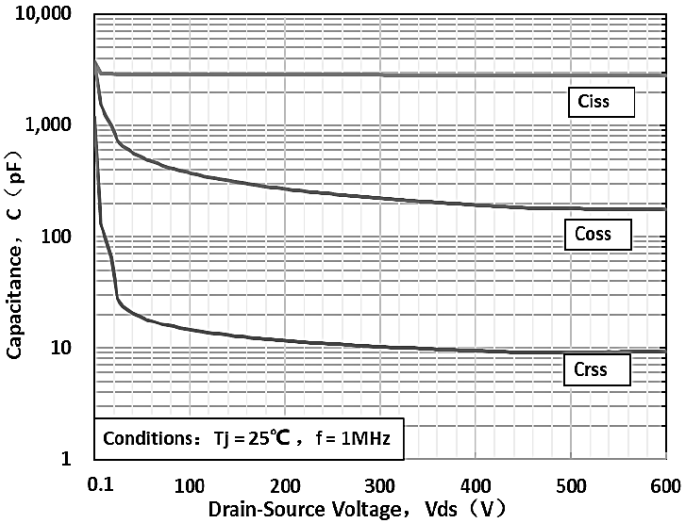


Figure 17. Capacitance Characteristics

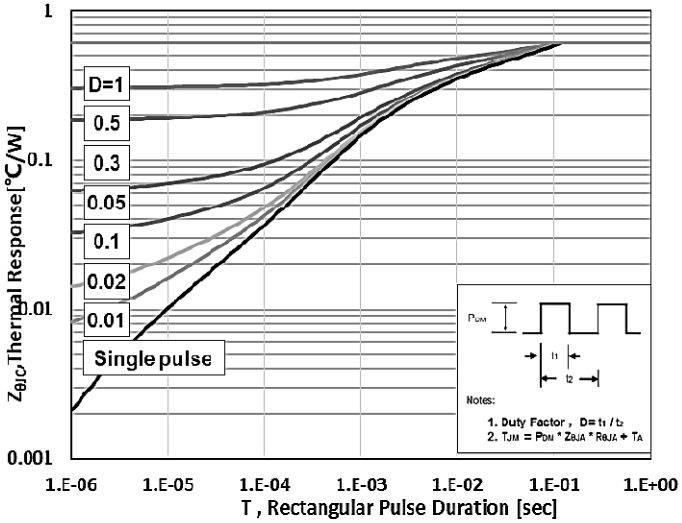
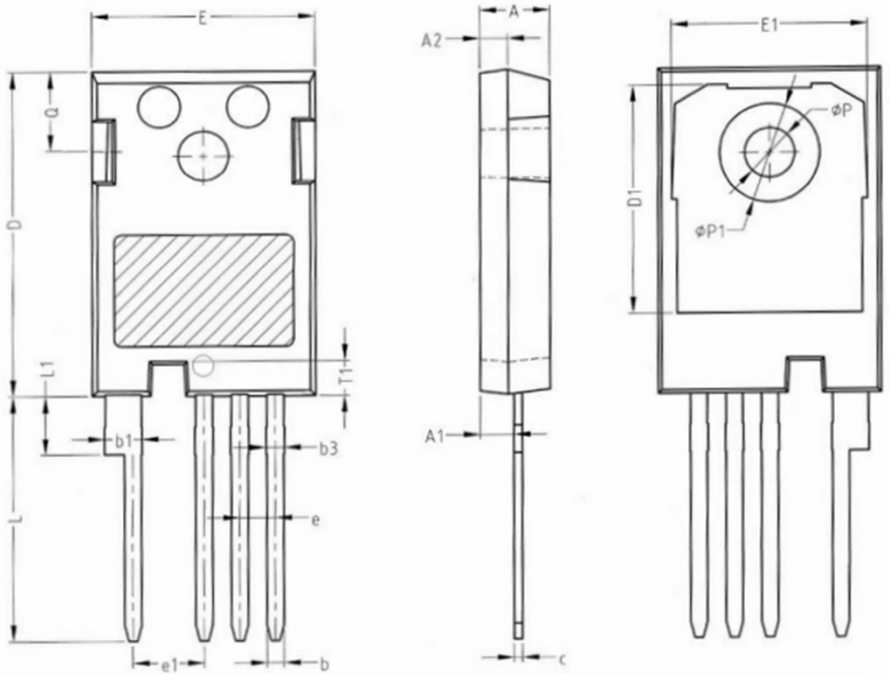


Figure 18. Transient Thermal Impedance

Product dimension (TO-247-4L)



Dim	Millimeters		
	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
T1	2.35	2.50	2.65
e	2.54 BSC		
e1	5.08 BSC		
Q	5.49	5.79	6.09
L	17.27	17.57	17.87
L1	3.99	4.19	4.39
ΦP	3.40	3.60	3.80
ΦP1	7.19 REF		

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